

# SIEMENS

## POWERMOBIL/ ARCOSKOP

**SP**

### Image quality quick test

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English

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**System identification**

Part No.:	_____	Serial No.:	_____
Cust./Clinic:	_____		
Address:	_____	City:	_____
Country:	_____	State:	_____
Telephone No.:	_____	Cont. person:	_____
System No.:	_____	Branch:	_____
Responsible system engineer:	_____		

Image quality acceptance performed completely in the factory and documented by:

Name (block capitals): \_\_\_\_\_ Department: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

**Date of installation of the system at the customer's site:** \_\_\_\_\_

Image quality quick test performed in connection with:

Turnover to customer: ☐

Maintenance: ☐

Adjustments deviating from standard due to:

Country-specific regulations ☐

Special customer request ☐

Reason: \_\_\_\_\_  
\_\_\_\_\_

Name (block capitals): \_\_\_\_\_ Regional office: \_\_\_\_\_

Signature: \_\_\_\_\_

**Required measuring instruments and devices**

- Set of X-radiation filters 10 x 0.3 mm Cu 44 06 120 RV090
- 2.1 mm Cu precision X-radiation filter 99 00 598 XE999
- 25 mm Al spacer, Type 26765 acc. to DIN 6868 Part 50  
or  
1.2 mm Cu from the radiation filter set 97 98 596 G5321 and  
17 µm Cu strip 11 67 662 G5247
- Set of resolution test patterns 28 71 820 RE999  
Factory: Resolution test Type 41a
- Densitometer e.g. X-Rite 331 97 02 416 Y1996  
or PTW-BC21 including Black-Check  
Type 5321 and Light box Type 53213
- TV dynamic range test kit 37 90 156 X1963  
or 97 50 001 X1963
- contains: TV dynamic test 37 90 164 X1963  
Heart contour diaphragm 37 90 172 X1963  
Capillary test 37 90 180 X1963  
Holder 87 13 901 X1963  
Lead step test 87 09 743 X1963
- Protective conductor meter 44 15 899 RV090
- Service PC
- Service Software POWERMOBIL / ARCOSKOP
- Service PC-System serial interface cable 99 00 440 RE999  
or 96 60 978 RE999

**Test requirements**

- The entire system must be functioning properly; in addition, make sure that the
  - grid,
  - X-ray I.I. cover, and
  - POWERPHOS cover (without DHHS spacer) are installed.
- The POWERPHOS temperature must be < 50° celsius; the temperature indicator LED must be dark.
- If the nominal values are not attained, the system must be adjusted or repaired according to the service instructions.
- Mark the appropriate boxes ☐ y/n with "y" for yes or "n" for no.


## Prerequisites

- The standard settings are programmed for fluoroscopy, pulsed fluoroscopy and DR. (See Appendix).
- Attach the 2.1mm Cu radiation filter for prefiltration at the X-ray port on the tube assembly.
- Select the dose level according to table "Standardprogrammings (Chapter 10). The dose rate values are included in the User manual.

## Evaluation



### NOTICE

The ADC curves programmed as standard have to be checked. If other ADC curves have been programmed at the customer's request, first check the standard programmed characteristics for comparison to ensure that nothing has changed in the system following delivery from the factory.


The curves available in the operating mode selected in each case can be selected with the  button.

## ADC curves for fluoroscopy operating mode



- Select  and image intensifier full image format.
- Select Sirematic S2 ADC curve; the LED of the  button is off.
- Radiation on.
- Read the indicated kV and mA values on the control panel.
- Radiation off.
- Enter the values in Tab. 1.



- Select Sirematic HC 2 ADC curve; the LED of the  button is on.
- Radiation on.
- Read the indicated kV and mA values on the control panel.
- Radiation off.
- Enter the values in Tab. 1.
- The actual values documented in the factory must be reproduced at the application site. Permissible deviations: Tube voltage (kV)  $\pm 1$  kV, tube current (mA)  $\pm 10$  %.

ADC curves fluoroscopy	Nominal values (Factory)		Actual values			
			Factory		Application site	
	kV	mA	kV	mA	kV	mA
Sirematic S2	68 - 75	1.0 - 1.4				
Sirematic HC 2	67 - 72	1.2 - 2.2				



Tab. 1

**ADC curves for pulsed fluoroscopy operating mode and DCM**


ARCOSKOP: DCM option available: ☐ yes ☐ no

If no, the ADR curves for the "DCM" operating mode do not need to be checked.





- Select  and image intensifier full image format.
- Select the highest pulse frequency
- Select Sirematic S2 ADC curve; the LED of the  button is off.
- Radiation on.
- Read the indicated kV and mA values on the control panel.
- Radiation off.
- Enter the values in Tab. 2.




- Select Sirematic HC 2 ADC curve; the LED of the  button is on.
- Radiation on.
- Read the indicated kV and mA values on the control panel.
- Radiation off.
- Enter the values in Tab. 2.



- Select  .
- Select the highest pulse frequency
- Select Sirematic S2 ADC curve; the LED of the  button is off.
- Radiation on.
- Read the indicated kV and mA values on the control panel.
- Radiation off.
- Enter the values in Tab. 2.



- Select Sirematic HC 2 ADC curve; the LED of the  button is on.
- Radiation on.
- Read the indicated kV and mA values on the control panel.
- Radiation off.
- Enter the values in Tab. 2.
- The actual values documented in the factory must be reproduced at the site.  
Acceptable deviations: Tube voltage (kV)  $\pm 1$  kV, tube current (mA)  $\pm 10$  %.






ADC curves pulsed fluoroscopy	Nominal values (Factory)		Actual values			
			Factory		Application site	
	kV	mA	kV	mA	kV	mA
Sirematic S2; $f_{\max}$	66 - 75	1.2 - 1.8				
Sirematic HC 2; $f_{\max}$	65 - 72	1.1 - 2.8				
DCM S2 $f_{\max}$ *1	70 - 78	2,9 - 4,0				
DCM HC 2 $f_{\max}$ *1	65 - 74	2,8 - 8,0				

Tab. 2

\*1) ARCOSKOP: Complete only if "DCM" option is available.

### ADC curves for DR operating mode

- Select  and image intensifier full format.
- Select noise reduction "K=1" (Single shot); LED of the button  is on.
- Radiation on.
- Read the indicated kV and mA values on the control panel.
- Radiation off.
- Select noise reduction "K=8"; LED of the button  is off.
- Radiation on.
- Read the indicated kV and mA values on the control panel.
- Radiation off.
- Enter the values in Tab. 3.
- The actual values documented in the factory must be reproduced at the application site.  
Acceptable deviations: Tube voltage (kV)  $\pm 1$  kV, tube current (mA)  $\pm 10$  %.

ADC curves DR, HC 3	Nominal values (Factory)		Actual values			
			Factory		Application site	
	kV	mA	kV	mA	kV	mA
DR 1 kW; EB	61 - 67	2,9 - 10,1				
DR 1 kW; K=8	66 - 73	6.5 - 12				

Tab. 3


- Select "High" as the dose level (User setup).


## Checking the resolution and the minimum contrast

ARCOSKOP: DCM option available: ☐ yes ☐ no

If no, the resolution and minimum contrast for the "DCM" operating mode do not need to be checked.

- Prerequisites:

- Select FLUORO and the "Mid" dose rate level!
- Select Sirematic S2 ADC curves; LED of the  button is off.
- Set edge enhancement to optimum detection of resolution.

- Press the button for noise reduction ; the LED of the button must be off.
- Set the contrast (LUT) for the monitors to optimum recognition of resolution.
- Factory: Use resolution test Type 41 A.
- Application site: Use resolution text Type 41.

Attach the resolution test directly to the grid in the center of the image intensifier. It should be located at an angle of approximately 45° to the grid lines.

- Factory:



Attach 25 mm Al measuring stand to the image intensifier.

- Application site:




If a 25 mm Al measuring stand is present (with 0.4 mm notch) attach this close to the image intensifier.

Otherwise:

Attach the 17 µm Cu strip directly to the grid next to the resolution test and place an additional 1.2 mm Cu filtration in the beam path, close to the tube.

- If overframing occurs at the edge of the image intensifier, eliminate this with collimation.
- Switch radiation "ON". Determine the resolution during radiation and enter it in Table 1.
- Switch radiation "OFF". Determine the resolution of the LIH image and enter it in Table 1.
- Store the LIH image; it is then displayed on monitor 2.
  - In each case, check that the minimum contrast is detectable. (Notch in 25 mm Al or 17 µm Cu strip.)
- Repeat this procedure in the  and  modes.




- Evaluation
  - Determine the line pairs/mm and enter the value in table 1.

Operating mode		Image intensifier format	Nominal resolution values [Lp/mm]		Actual resolution values [Lp/mm]			
			RBV 23 (9")	RBV 27 (11")	Factory		Application site	
					Monitor 1	Monitor 2	Monitor 1	Monitor 2
	during radiation	Full format	≥ 1.2	≥ 1.0		n.a.		n.a.
	during radiation	Zoom	≥ 1.6	≥ 1.6		n.a.		n.a.
	LIH	Full format	≥ 1.2	≥ 1.0				
	LIH	Zoom	≥ 1.6	≥ 1.6				
	during radiation	Full format	≥ 1.2	≥ 1.0		n.a.		n.a.
	during radiation	Zoom	≥ 1.6	≥ 1.6		n.a.		n.a.
	LIH	Full format	≥ 1.2	≥ 1.0				
	LIH	Zoom	≥ 1.6	≥ 1.6				
 *1	during radiation	Full format	≥ 1.2	≥ 1.0		n.a.		n.a.
	during radiation	Zoom	≥ 1.6	≥ 1.6		n.a.		n.a.
	LIH	Full format	≥ 1.0	≥ 0.9				
	LIH	Zoom	≥ 1.4	≥ 1.4				

Tab. 1

\*1) ARCOSKOP: Complete only if "DCM" option is available.

## Minimum contrast detectable ?

Operating mode	Image intensifier format	Minimum contrast is visible	
		Factory	Application site
	Full format	<input type="checkbox"/> y/n	<input type="checkbox"/> y/n
	Zoom	<input type="checkbox"/> y/n	<input type="checkbox"/> y/n
	Full format	<input type="checkbox"/> y/n	<input type="checkbox"/> y/n
	Zoom	<input type="checkbox"/> y/n	<input type="checkbox"/> y/n
 *1	Full format	<input type="checkbox"/> y/n	<input type="checkbox"/> y/n
	Zoom	<input type="checkbox"/> y/n	<input type="checkbox"/> y/n

The minimum contrast must always be visible.

\*1) ARCOSKOP: Complete only if "DCM" option is available.

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## NOTICE

Perform the tests of chapter 4 only at the factory.





## NOTICE

The dynamic test in conjunction with the Plexi capillary test is used to display small differences in contrast.

### • Test arrangement

- Attach the dynamic test without the holder but with heart contour diaphragm and Plexi capillary test directly in front of the image intensifier input (Plexi capillaries close to X-ray image intensifier).

### • Prerequisites:

- Select FLUORO (  button) standard settings (refer to Appendix)
- Select Sirematic S2. (LED in the  button is off.)
- Select full format.
- Select high noise reduction. The LED of the  button is off.
- Edge enhancement (  button) off.
- Select LUT 1.
- Switch on radiation and evaluate the live image.

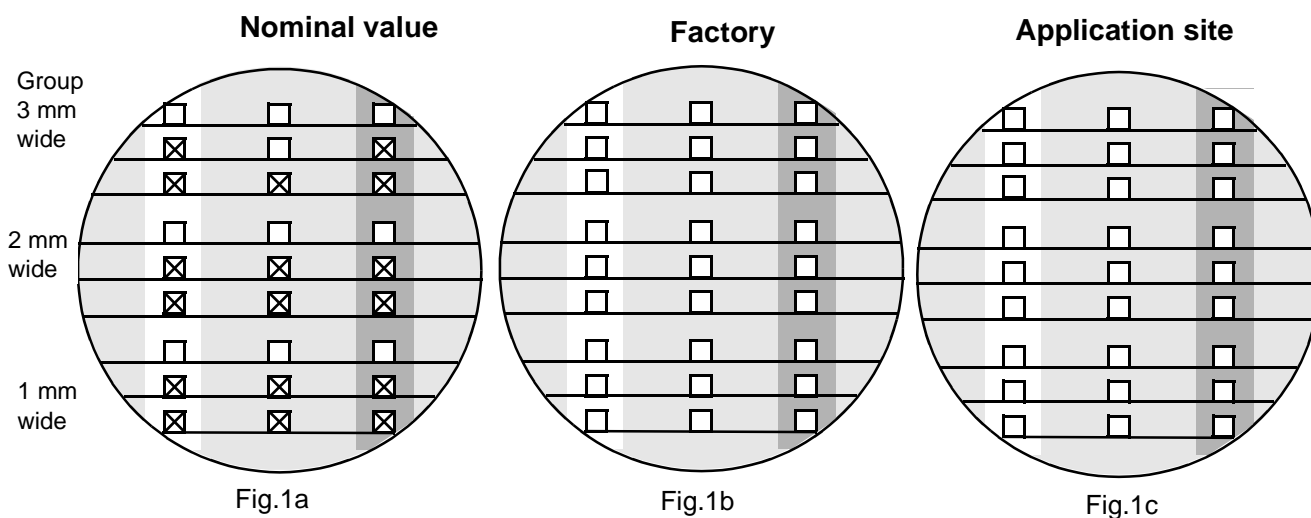


### • Evaluation of the monitor image

#### - Nominal value

The unmarked Plexi capillaries in Fig. 1a must be visible.

- Cross off Plexi capillaries in Fig. 1b that are not visible.



**Capillary test for Memoskop Fast with option SUB**

Memoskop Fast with option SUB / Roadmap is present:

☐ y/n

If no, omit the capillary test for both operating modes.

**Subtraction mode****Measurement setup**

- Attach the dynamic test without the holder but with the heart contour diaphragm and Plexi capillary test directly in front of the image intensifier input (Plexi capillaries close to image intensifier).

**Prerequisites**

- Select SUB.
- Select full format.
- Select dose rate level "High".
- Select noise reduction for mask  $k = 32$ .
- Select noise reduction for fill  $k = MD2$ .
- Edge enhancement off.

**Procedure**

- Release the scene (radiation on).
- After  $\geq 2$  seconds, the mask is automatically placed.  
The "Inject" message appears on the monitor.
- Start the Plexi capillary test by pressing the rubber ball.
- Shut off radiation after 3 seconds.



## Evaluation 1

- Select LUT 4.
- Find the capillary lines to be evaluated on monitor B in the individual matrix fields. They should be separated according to black and white.

### NOTICE

**Do not evaluate the first white line. Start the evaluation with the first black line.**

- Enter the results in table 1 and table 2. If a line is not recognizable, identify it with x.

	Nominal values			Factory			Site			Group
	2L	1	5R	2L	1	5R	2L	1	5R	
Black										upper group 3 mm wide
Black			X							
Black	X	X	X							
Black										middle group 2 mm wide
Black		X	X							
Black	X	X	X							
Black										lower group 1 mm wide
Black			X							
Black	X	X	X							

Tab. 1

	Nominal values			Factory			Site			Group
	2L	1	5R	2L	1	5R	2L	1	5R	
White										upper group 3 mm wide
White		X	X							
White	X	X	X							
White										middle group 2 mm wide
White		X	X							
White	X	X	X							
White										lower group 1 mm wide
White			X							
White	X	X	X							

Tab. 2

**Evaluation 2**

- Evaluate the 3mm white capillary lines in the 2L, 1 and 5R fields on monitor B.  
No obvious brightness differences should be visible between the fields.

No obvious brightness differences  
are visible in fields 2L, 1 and 5R:

**Factory**  
☐ y/n

**Site**  
☐ y/n

- Evaluate the 3mm black capillary lines in fields 2L, 1 and 5R on monitor B.  
No obvious brightness difference should be visible between the fields.

No obvious brightness differences  
are visible in fields 2L, 1 and 5R:

**Factory**  
☐ y/n

**Site**  
☐ y/n

**Roadmap Mode****Measurement setup**

- Attach the dynamic test without the holder but with the heart contour diaphragm and Plexi capillary test directly in front of the I.I. input (Plexi-capillaries close to image intensifier).

**Prerequisites**

- Select Roadmap.
- Select full format.
- Select dose rate level "MID".
- Select noise reduction for phase A:  $k = 16$ .
- Select noise reduction for phase B:  $k = 8$ .
- Select noise reduction for phase C:  $k = MD2$ .
- Edge enhancement off.

**Procedure**

- Release the scene (radiation on; Phase A)
- After  $\geq 2$  seconds, the mask is automatically placed. The "Inject" message appears on the monitor.



- Do not shift the Plexi capillaries. (radiation remains on; Phase B)
- Shut off radiation after 3 more seconds.
- Release radiation again. (Phase C)
- Start the Plexi capillary test by pressing the rubber ball.
- Shut radiation off after 3 more seconds.

## Evaluation

- Select LUT 4.
- Find the capillary lines to be evaluated on monitor B in the individual matrix fields. They should be separated according to black and white.

### NOTICE

**Do not evaluate the first white line. Start the evaluation with the first black line.**

- Enter the results into table 3 and table 4. If a line is not identifiable, mark it with x.

	Nominal values			Factory			Site			Group
	2L	1	5R	2L	1	5R	2L	1	5R	
Black										upper group 3 mm wide
Black		X	X							
Black	X	X	X							
Black										middle group 2 mm wide
Black	X	X	X							
Black	X	X	X							
Black										lower group 1 mm wide
Black		X	X							
Black	X	X	X							

Tab. 3

	Nominal values			Factory			Site			Group
	2L	1	5R	2L	1	5R	2L	1	5R	
White										upper group 3 mm wide
White	X	X	X							
White	X	X	X							
White										middle group 2 mm wide
White	X	X	X							
White	X	X	X							
White										lower group 1 mm wide
White		X	X							
White	X	X	X							

Tab. 4

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NOTICE


Perform the tests of chapter 5 only at the factory.



- **Prerequisites:**
  - Attach the dynamic test without the holder but with the heart contour diaphragm and Plexi capillary test directly in front of the image intensifier input (Plexi capillaries close to the X-ray image intensifier).
  - Select FLUORO
  - Contrast setting for monitors - step 1 (LUT = 1)
  - Edge enhancement = 0






Edge enhancement

- Switch fluoroscopy on briefly. The LIH image is visible on the monitor.
  - Press the button for edge enhancement  several times.  
The levels of edge enhancement are selected consecutively.  
(Edge enhancement off - Edge enhancement stage 1 - Edge enhancement stage 2...)
- |  | Factory                      | Application site             |
|--|------------------------------|------------------------------|
| - Edge enhancement function test o.k.?<br>(The bright - dark transitions become clearly visible when selecting level 1 to 4) | <input type="checkbox"/> y/n | <input type="checkbox"/> y/n |



Noise reduction

- Press the button for selecting the noise reduction factor ; the LED of the button must light up (low noise reduction).
  - Switch fluoroscopy on briefly and assess the noise impression of the image during radiation.
  - Press the button for selecting the noise reduction factor ; the LED of the button is off (high noise reduction).
  - Switch fluoroscopy on briefly and assess the noise impression of the image with radiation on.
- |  | Factory                      | Application site             |
|--|------------------------------|------------------------------|
| - Noise reduction functioning o.k.?<br>Image noise is less with the LED of the  button off ). | <input type="checkbox"/> y/n | <input type="checkbox"/> y/n |

## Motion detector

### Prerequisites

**NOTICE**
**Use a nonmagnetic screwdriver!**


- Select
- Select the noise reduction MD 2; the LED in the button is off.
- In addition, place a screwdriver centrally on the dynamic test.
- Radiation "ON"
  - ⇒ When activating the key for image rotation, the live image shows a slight trailing effect.
  - ⇒ The image noise is more clearly visible in the moving parts of the image.
- Radiation "OFF"

### Evaluation of the monitor image.

**Factory**

- Motion detection o.k.?  
(image noise clearly visible in moving part of image)

☐ y/n

## Motion blurring

 ARCOSKOP: DCM option available: ☐ yes ☐ no

If no, omit function test for motion blurring for "DCM" operating mode.



- Call .
- Select the noise reduction MD 2; the LED in the button is off.
- In addition, place a screwdriver (nonmagnetic) centrally on the dynamic test.
- Radiation "On"
  - ⇒ When activating one of the keys for image rotation, the live image shows a slight trailing effect.
- Radiation "Off"
- Requirement for : pulse frequency > 2 p/s.






- With the and modes, each with Radiation "On".

in addition activate the keys for image rotation.

- ⇒ The object is displayed without a trailing effect.

## Evaluation of monitor image

	Factory
Functional check during  OK?	<input type="checkbox"/> y/n
Functional check during  OK?	<input type="checkbox"/> y/n
Functional check during  OK? *1	<input type="checkbox"/> y/n

\*1) ARCOSKOP: Complete only if "DCM" option is available.

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**NOTICE****Perform this test only at the factory.**

The following control systems are in operation with the indicated prefiltration:



ADC	at approx. 8 mm Cu and dynamic test in the beam path
Iris diaphragm	at approx. 10 mm Cu and dynamic test in the beam path
AGC	at approx. 12 mm Cu and dynamic test in the beam path

This test is used to check the operation of these control systems.

**Prerequisites**

- Monitors must be set for approximately the same (synchronous) brightness and contrast (LUT, brightness and contrast setting).
- Select the same LUT for both monitors. Do not select the LUT "AUTO"!
- Select edge enhancement 0 for both monitors.

**Preparations**

- Attach the dynamic test
  - without holder,
  - with heart contour diaphragm,
  - without Plexi capillary test to the image intensifier.
- Select  . Select dose rate level "Mid".
- Select Sirematic S2 ADC curve; the LED of the  button is off.
- Switch I.I. to full format.
- Switch X-ray image intensifier to full size.
- Open the collimator to maximum aperture.
- Prefilter with copper until 122 kV to 124 kV is displayed.  
Switch fluoro on briefly (around 8 mm Cu required).
- Radiation ON.
- Evaluate the brightness of the fluoro image.
- Radiation OFF.
- Store LIH image and display on monitor B.



**Evaluation 1**

- Attach an additional 2.1 mm Cu at the radiation output.
- Radiation ON;  
The generator maximum 125 kV / 4.3 mA must be attained.
- Evaluate the brightness of the fluoro image.
  - ⇒ The brightness with approx. 8 mm Cu prefiltration and dynamic test (display on monitor B) should be approximately equal to the brightness with 10 mm Cu and the dynamic test (display on monitor A).
- Radiation OFF.

**Factory**

Brightness with ADC and iris diaphragm control the same? ☐ y/n

**Evaluation 2**

- Store the LIH image (approx. 8.1 mm Cu prefiltration and dynamic test) and display on monitor B.
- Attach additional approx. 2.1 mm Cu to the radiation output.
- Radiation ON;
- Evaluate the brightness of the fluoro image.
  - ⇒ The brightness with approximately 10 mm Cu prefiltration and dynamic test (stored reference image) must roughly equal the brightness with approximately 12 mm Cu and dynamic test.
- Radiation OFF.

**Factory**

Brightness with ADC and AVR the same? ☐ y/n

## Image artifacts

- Cross off all image artifacts which have been detected during setting and image quality tests in the table in the image quality test certificate.
- If any image artifacts are detected which are not listed in the table, these must be described under "Other artifacts".
- To evaluate the respective artifacts, there are three rating numbers which indicate the extent of each artifact:

## Definition of the rating numbers

- 1 = No artifacts could be determined during start-up.
- 2 = A few artifacts occurred sporadically during start-up. The cause could not be located and the "error" could not be corrected. The artifacts do not negatively influence the overall appearance of the images and do not compromise the diagnostic value of the images in any way. The artifacts are determined to be tolerable.
- 3 = During start-up, artifacts occurred frequently or with greater severity and they negatively influenced the overall appearance of the images or compromised their diagnostic value. Therefore, the artifacts were determined to be intolerable and the system could not be turned over to the customer.

## Description of the artifacts

- **Hum:**  
Inhomogeneity caused by electromagnetic fields in imaging systems. Depending on the degree, this artifact may significantly influence the diagnostic value of the images. Optimally, this artifact should not occur at all, however, extremely low levels can be tolerated. Hum artifacts appear as periodic, horizontal bright and dark structures in the image; they appear briefly and are not specific to one location.
- **Interference stripes**  
Very high-frequency electromagnetic fields appear in the image as bright or dark, sometimes very short, transverse marks in the image. They appear briefly. Stripes caused by contaminants on the surfaces of lenses, etc. should be included in this group. In this case, they are specific to one location and appear constantly. Stripes cannot be tolerated.
- **Ghosting:**  
These artifacts are object contours displayed twice, with the second contour generally shifted laterally. They are caused by reflections in long, poorly adjusted video cables. Clearly visible ghosting cannot be tolerated.
- **Background structures** are stationary, grid-shaped patterns primarily in dark regions of the image. They are also referred to as "standing noise".
- **Pixel errors** are image pixels without image information. They are visible on the monitor as bright and black dots the size of pixels.  
Some types of pixel errors can be tolerated while others cannot. The TV camera is carefully inspected with respect to pixel errors at the TV test bay prior to shipment. TV cameras can be turned over to the customer only if the number of pixel errors meets the factory specifications. These pixel errors can be tolerated and must be documented in the IQ test certificate.

**Image artifacts**

Required value for the assessment of the artifact: Only 1 and 2 can be tolerated

	Factory			Start-up		
Type of artifact	Assessment of the artifact*1					
	1	2	3	1	2	3
Hum						
Interference stripes						
Ghost images (reflections)						
Background structures						
Pixel error						

**\*1 Rating number of artifact**

1 = No artifacts

2 = Slight artifacts

3 = Disturbances that cannot be tolerated

Remarks: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Other artifacts:**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(Upon customer request only, at the application site.)

The customer has selected the standard organ programs:

☐ y/n

If "y": omit this chapter.



## Checking the newly programmed ADC control curves

### Prerequisites

The test of the standard programmed ADC control curves (Sirematic S2 and Sirematic HC 2) was already performed. Refer to chapter 2 of these instructions.

- Select "Mid" as the dose rate level.
  - ⇒ The corresponding dose rate can be found in the Operating Instructions.
- If required, program the dose rate levels in the organ programs temporarily to "Mid".


**Procedure**

- Select .
- Attach a 2.1 mm Cu prefilter to the radiation output.
- After selecting the respective fluoro organ program and activating the  key, the programmed ADC control curves can be selected.

**NOTICE**

**Note the programmed dose rate level. To check the newly programmed ADC control curves, temporarily program the "Mid" dose rate level (refer above).**

**Evaluation**

- Switch fluoro ON .
- Read the kV and mA values displayed on the control panel.
- Switch fluoro ON . Enter the values for the associated ADC control curve in table 1.
- Select any additionally programmed ADC control curves by selecting the corresponding organ programs and the  key and enter the kV and mA values in table 1.
- Enter "n.a." in the kV and mA fields of the ADC control characteristics not used.

ADC-Curve	Typical values		Actual values on-site	
	kV	mA	kV	mA
SIREMATIC LD	80 - 96	0.4 - 0.6		
SIREMATIC S1	67 - 79	0.4 - 0.8		
SIREMATIC S2	65 - 75	0.9 - 1.4		
SIREMATIC HC1	67 - 73	1.0 - 2.3		
SIREMATIC HC2	67 - 73	1.2 - 2.8		
SIREMATIC HC3	61 - 66	2.1 - 5.0		
CAR	78 - 80	0.4 - 2.0		
IODINE	66	1.0 - 5.0		

Multispot 2000 present? ☐ y/n  
If "n": chapter not applicable.

Since the Multispot 2000 must be optimally set for the film used and the development required at the user's site, only a functional test is performed at the factory.

## Functional check at the factory

The functional check must be performed for all possible image subdivisions, in each case with positive and negative image display.

Definition: Positive image display means that the hardcopy image is identical with the monitor display.

## Requirements

- Select Memory test image (Appendix).
- Set LUT to position 1.
- A camera warm-up period of 20 minutes must be observed.
- Select the image subdivision to be tested in each case.
- Select the image display (positive/negative) to be tested in each case.
- Set the relevant B, C, D values shown in Table 1:

	positive image display				negative image display			
	B	C	D		B	C	D	
			at 50 Hz refresh rate	at 60 Hz refresh rate			at 50 Hz refresh rate	at 60 Hz refresh rate
Multispot 2000 1/4, full format	008	550	035	042	020	660	035	042
Multispot 2000 1/4, 4-on-1 image	008	550	016	019	020	660	016	019
Multispot 2000-2	008	550	021	025	020	660	021	025

Tab. 1

- Enter the film type used and the emulsion number:

Film type: Kodak EKTASCAN DNB; Emulsion number: \_\_\_\_\_

- Enter the film density values measured in Table 2.

### NOTICE

**In the case of deviations from the nominal value 2 (film density 40%), B must be corrected (adjusted).**

Mark the fields which are not applicable with n.a.

	Setting values factory function check			Film density		
	B	C	D		Nominal value	Factory
MS 2000 1/4, full image, negative image display				0% (1)	$\leq 0.27$	
				40% (2)	$1.0 \pm 0.3$	
				100% (3)	$\geq 2.4$	
MS 2000 1/4, full image, positive image display				0% (1)	$\geq 2.4$	
				40% (2)	$1.3 \pm 0.3$	
				100% (3)	$\leq 0.27$	
MS 2000 1/4, 4-on-1 image negative image display				0% (1)	$\leq 0.27$	
				40% (2)	$1.0 \pm 0.3$	
				100% (3)	$\geq 2.4$	
MS 2000 1/4, 4-on-1 image positive image display				0% (1)	$\geq 2.4$	
				40% (2)	$1.3 \pm 0.3$	
				100% (3)	$\leq 0.27$	
MS 2000-2, negative image display				0% (1)	$\leq 0.27$	
				40% (2)	$1.0 \pm 0.3$	
				100% (3)	$\geq 2.4$	
MS 2000-2, positive image display				0% (1)	$\geq 2.4$	
				40% (2)	$1.3 \pm 0.3$	
				100% (3)	$\leq 0.27$	

Tab. 2



## Setting the multiformat camera at the customer's site

The setting must be performed for all possible image subdivisions, in each case with the image display (positive and/or negative) desired by the customer.

Mark the settings not performed with n.a. in the relevant table.

Definition: Positive image display means that the hardcopy image is identical with the monitor display.

- Film type used: \_\_\_\_\_ Emulsion number: \_\_\_\_\_
- Select Memory test image (Appendix).
- A camera warm-up period of 20 minutes must be observed.
- Set LUT to position 1.
- Start the setting procedure with the B, C, D values shown in Table 2.
- Select the image subdivision to be set in each case.
- Select the image display to be set in each case.
- Change B until the 40% gray level (see Fig.1) corresponds to the nominal value for the film density  $D_{nom}$  (see Tables 3 to 6).
- Change C until the film density values for white and black correspond to the nominal values (see Tables 3 to 6).

When increasing the contrast values (C), ensure that the 100% fields and 90% fields and the 0% fields and 10% fields can be distinguished from one another.

### Multispot 2000-2

#### Negative image display

- Enter the values determined in Table 3.
- Enter the values programmed for B, C, and D in Table 3.

#### Positive image display:

- Enter the values determined in Table 4.
- Enter the values programmed for B, C, and D in Table 4.

### Multispot 2000 1/4:

#### Negative image display

Full-field image ( $1/1$ )

- Enter the values determined in Table 3.
- Enter the values programmed for B, C, and D in Table 3.

4-on-1 image ( $1/4$ )

- Enter the values determined in Table 5.
- Enter the values programmed for B, C, and D in Table 5.

**Positive image display:**

Full-field image ( $1/1$ )

- Enter the values determined in Table 4.
- Enter the values programmed for B, C, and D in Table 4.

4-on-1 image ( $1/4$ )

- Enter the values determined in Table 6.
- Enter the values programmed for B, C, and D in Table 6.

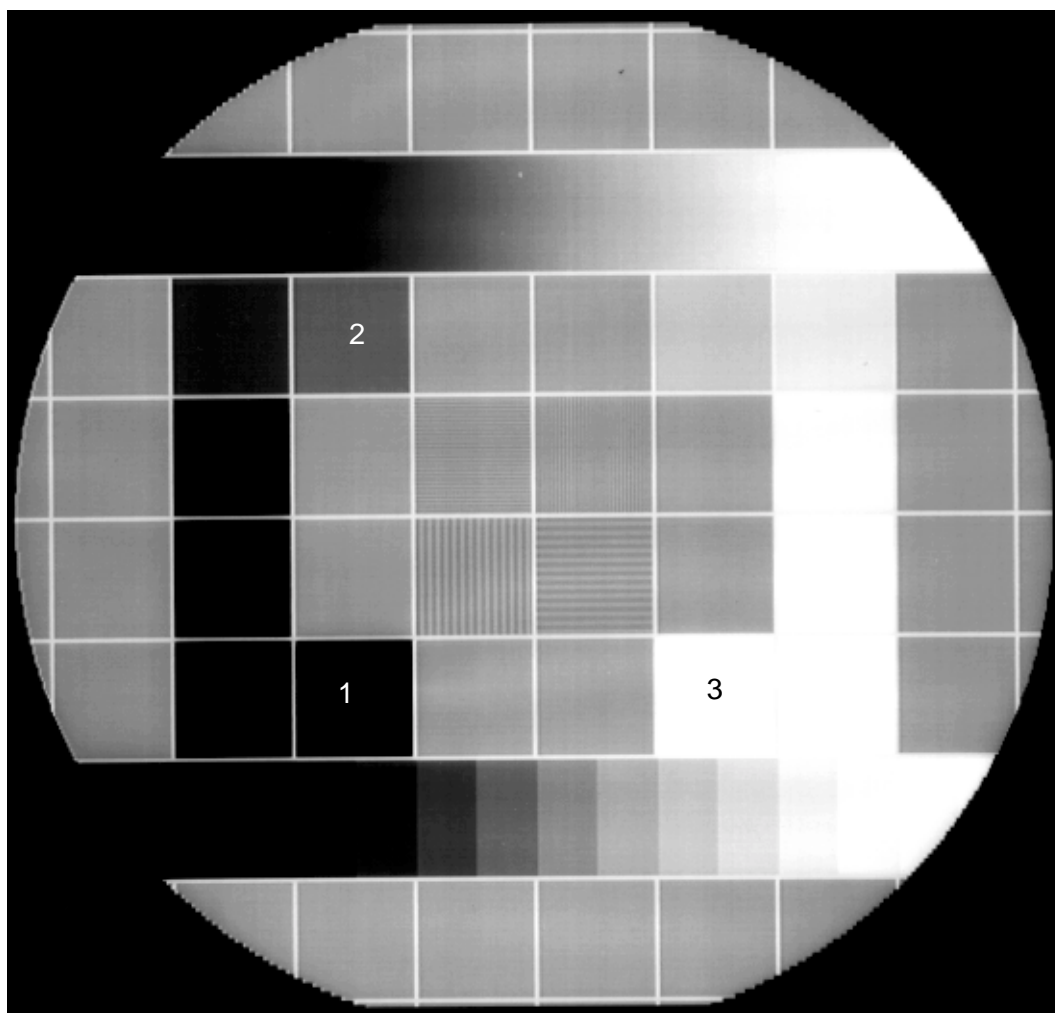


Fig. 1

Memory test image on the monitor [Film = Positive image display]

Application site:

**Film density values for Multispot 2000-2 or Multispot 2000 1/4 with full-field image and negative image display:**

Field	Film density nominal values $D_{nom}$	Film density D	Programmed values	
0% (1)	$\leq 0.25$		B	
40% (2)	$1.0 \pm 0.1$		C	
100% (3)	$\geq 2.5$		D	

Tab. 3

Application site:

**Film density values for Multispot 2000-2 or Multispot 2000 1/4 with full-field image and positive image display:**

Field	Film density nominal values $D_{nom}$	Film density D	Programmed values	
0% (1)	$\geq 2.4$		B	
40% (2)	$1.3 \pm 0.1$		C	
100% (3)	$\leq 0.25$		D	

Tab. 4

Application site:

**Film density values for Multispot 2000 1/4 with 4-on-1 and negative image display:**

Field	Film density nominal values $D_{nom}$	Film density D	Programmed values	
0% (1)	$\leq 0.25$		B	
40% (2)	$1.0 \pm 0.1$		C	
100% (3)	$\geq 2.5$		D	

Tab. 5

Application site:



**Film density values for Multispot 2000 1/4 with 4-on-1 and positive image display:**

Field	Film density nominal values $D_{nom}$	Film density D	Programmed values	
0% (1)	$\geq 2.4$		B	
40% (2)	$1.3 \pm 0.1$		C	
100% (3)	$\leq 0.25$		D	

Tab. 6

## Checking the Multispot resolution

### Prerequisites

- Select  (for standard settings see Appendix)
  - Select Sirematic S2 ADC control characteristic; the LED of the  button is off.
- Select image intensifier full format.
- Set contrast setting for monitor B to LUT 1.
- Factory: Resolution test Type 41A; Application site: Resolution test Type 41
- Fasten the resolution test at around 45 degrees inclined to the grid lines in the image intensifier center directly on the grid.
- **Factory:** Attach 25 mm Al measuring stand close to the image intensifier.
- **Application site:** With 25 mm Al measuring stand present (with 0.4 mm notch), attach this close to the image intensifier.  
Otherwise: Fasten 17µm Cu next to the resolution test directly on the grid and attach 1.2 mm Cu in the beam path close to the tube.



- If overframing occurs at the edge of the image intensifier, mask this out.
- Switch radiation "on" and let it stabilize. Switch radiation "off".
- Transfer (store) the LIH image on monitor B.
- Select negative image display of the Multispot.



### Multispot 2000-2:

- Expose the film (both partial exposures) and develop it.
- Evaluate both partial exposures.
- Enter the lower resolution value in Table 7.

Resolution nominal values [Lp/mm] negative image display		Resolution actual values [Lp/mm] negative image display	
RBV 23 (9")	RBV 27 (11")	Factory	Application site
≥ 1.2	≥ 1.0		

Tab. 7



## Multispot 2000-1/4:

- Expose a film at full format.
- Evaluate the exposure.
- Enter the values determined in Tab. 7.
- Expose a film in 4-on-1 format (all 4 partial exposures).
- Evaluate all 4 partial exposures.
- Enter the lowest resolution value in Tab. 8.



Image format	Resolution nominal values [Lp/mm] negative image display		Resolution actual values [Lp/mm] negative image display	
	RBV 23 (9")	RBV 27 (11")	Factory	Application site
Full format	≥ 1.2	≥ 1.0		
4-on-1 format	≥ 1.0	≥ 1.0		

Tab. 8

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## Protective conductor control measurement







- If the POWERMOBIL/ ARCOSKOP covers were removed, reattach these and perform the protective conductor test in accordance with ARTD part 2 (CD-ROM).







## Calling up the stored test patterns

- Call up the MEMOSKOP user setup, monitor test image on the MEMOSKOP keyboard.

## Standard programming

The following default values are programmed in organ program 1 when the POWERMOBIL/ ARCOSKOP is delivered:

Organ program1 (User Setup)						
Operating mode				 *3	 *3	 *2
Program name (*4)	Standard FL	Standard PFC	Standard DR	Standard SUB	Standard Roadmap	Standard DCM
Dose rate	MID	MID	HIGH	MID	MID	MID
SIREMATIC normal	S2	S2	HC3	n.a. (Iodine)	n.a. (Iodine)	S2
SIREMATIC push	HC2	HC2	n.a.	n.a.	n.a.	HC 2
Noise red. Low	K = 2	MD3	K = 1	n.a.	n.a.	n.a.
Noise red. High	MD2 (K16:K2)	MD4	K = 8	n.a.	n.a.	n.a.
Pulse frequency	n.a.	6 (50Hz) 7,5 (60Hz)	n.a.	n.a.	n.a.	8 (50Hz) 10 (60Hz)
Auto transfer each image	NO	NO	n.a.	n.a.	n.a.	All
Disk transfer rate	2	n.a.	n.a.	n.a.	n.a.	n.a.
Auto disk transfer	n.a.	n.a.	YES	n.a.	n.a.	n.a.
Auto start of Loop	n.a.	NO	n.a.	n.a.	n.a.	YES
Max OP(*3)	n.a.	n.a.	n.a.	n.a.	n.a.	NO
Subtraction (*3)	n.a.	n.a.	n.a.	MAX	MAX	n.a.
Landmark (*3)	n.a.	n.a.	n.a.	NO	NO	n.a.
Video signal at docum. (*5)	n.a.	n.a.	n.a.	POS	POS	n.a.
Image display (*3)	n.a.	n.a.	n.a.	POS	POS	n.a.

Organ program1						
Operating mode				 *3	 *3	 *2
Duration of the phase B1 (*3)	n.a.	n.a.	n.a.	0 sec	n.a.	n.a.
Disk transfer rate phase B1 (*3)	n.a.	n.a.	n.a.	0	n.a.	n.a.
Disk transfer rate phase B2 (*3)	n.a.	n.a.	n.a.	6	n.a.	n.a.

\*2) ARCOSKOP: Only with DCM option.

\*3) For Memoskop Fast with option SUB

\*4) The name is listed as an example only and can be any program name.

\*5) Image display on film should correspond to image display on the monitor.

SUB & Roadmap Windows / Level			
/1 Brightness	100	/4 Brightness	115
/1 Contrast	195	/4 Contrast	225
/2 Brightness	105	/5 Brightness	120
/2 Contrast	205	/5 Contrast	235
/3 Brightness	110	/6 Brightness	127
/3 Contrast	215	/6 Contrast	245

SUB & Roadmap, Parameter Technical Setup	SUB	Road
Subtraction K-Factor, phase A	32	n.a.
Subtraction K-Factor, phase B	MD2	n.a.
Subtraction Time of phase A	2	n.a.
Roadmap K-Factor, phase A	n.a.	16
Roadmap K-Factor, phase B	n.a.	8
Roadmap K-Factor, phase C	n.a.	MD2
Roadmap Time of phase A	n.a.	2



All Chapters:	Revision page complemented
Page 2-1	New values in table added
Page 2-2	In chapter ADC curves.....last two lines deleted
Page 2-3	New values in table added
Page 2-4	Chapter: ADC curves Text and Symbols added  New values in table added
Page 3-2	New values in table added
Page 6-1	Prerequisites: Two sentences new added
Page 6-2	The generator maximum 125 kV/ 4.3 mA must be attained
Page 8-2	New values in table added

TD SD 24 / Arnold  
TD SD 24 / Groß  
SMS Iselin / Klenk

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